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Increased Growth and Yield of Peanuts (*Arachis Hypogaea* L.) with Tillage and Liquid Organic Fertilizer Fish Waste

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ABSTRACT

Peanut (*Arachis hypogaea* L.) is an important food commodity in Indonesia. The low production of peanuts in Riau Province has not been able to meet the people's need for peanuts. According to the Riau Province Food Crops Service (2022) the need for peanuts in Riau Province in 2019 is 8,516 tons, in 2020 the need for peanuts is 7,390 tons, and in 2021 the need for peanuts is 6,474 tons. This study aims to determine the effect and interaction between tillage and the application of fish waste liquid organic fertilizer (POC) and the single factor of both the growth and production of peanut plants and to get the best combination. The research was conducted using a split-plot design. The first factor as the main plot is tillage consisting of three levels, namely without tillage, minimum tillage, and maximum tillage. The second factor as a subplot was POC concentration consisting of four levels, without POC fish waste, 25% POC fish waste (250 ml POC + 750 ml water), 50% POC fish waste (500 ml POC + 500 ml water), and 50 % POC waste fish 75% (POC 750 ml + water 250 ml). Parameters observed included plant height, number of primary branches, flowering age, harvest age, number of pods, number of filled pods, seed production per plant, and weight of 100 seeds. The data obtained were analyzed statistically using analysis of variance and continued with Duncan's multiple range test at the 5% level using the SAS application. The results showed that the interaction of tillage and POC fish waste affected increasing plant height, number of primary branches, number of pods, number of filled pods, seed production per plant, and weight of 100 seeds.

Keywords: *peanut, tillage, liquid organic fertilizer of fish waste*

1. INTRODUCTION

Peanut (*Arachis hypogaea* L.) is an important food commodity in Indonesia. Peanuts have a high market demand and can be consumed in the form of boiled peanuts, fried peanuts, or as a raw material for the food industry to make jam, cooking oil, special seasoning, and others.

Peanuts contain important substances such as fat and protein whose content is almost equal to the protein content in meat, eggs, and soybeans. Sompie et al. (2023), states that peanuts contain 40-50% fat, 27% protein, 18% carbohydrates, vitamins, iron, vitamin E, vitamin B complex, vitamin A, vitamin K, lecithin, choline, and the mineral calcium.

The need for peanuts in Riau Province always increases every year along with the increasing population and the community's need for peanuts. According to the Riau Province Food Crops Service (2022), the need for peanuts in Riau Province in 2019 was 8,516 tons, while in 2020 the need for peanuts was 7,390, and in 2021 the need for peanuts was 6,474 tons. According to data obtained from the Central Bureau of Statistics (BPS) Riau Province (2022) peanut production in Riau Province in 2019 was 542 tons with a planting area of 575 ha or productivity of 0.98 ha^{-1}, while in 2020 it was 553 tons with a planted area of 595 ha or productivity of 0.98 ha^{-1}, while in 2021 it will be 557 tons with a planted area of 615 ha or productivity of 0.95 ha^{-1}.

The low production of peanuts in Riau Province is due to land conversion, low soil fertility, and sub-optimal cultivation techniques. One of the efforts to increase peanut production is to optimize cultivation techniques by improving the physical, biological, and chemical properties of the soil. Improvement of soil physical properties can be done by applying maximum tillage. According to Saputra et al. (2019), peanuts can grow well on loose soil. Loose soil conditions will provide convenience for bean plants, especially in terms of seed development, fruit buds penetrating the soil, and good pod formation.

In increasing the growth and yield of peanut plants it is not enough just to improve the physical properties, for this reason, it is also important to improve the chemical and biological properties of the soil. One effort that can be done to improve the chemical and biological properties of the soil is by applying organic fertilization given the high price of inorganic fertilizers in the market.

Organic fertilizers are fertilizers composed of living matter, such as weathering of plant, animal, and human remains. Sources of organic materials are in the form of compost, green manure, manure, crop residues (straw, stover, corn cobs, sugarcane bagasse, and coconut coir), livestock waste, industrial waste that uses agricultural materials, and municipal waste (garbage).

One of the organic materials that can be used as organic fertilizer is fish waste such as tail, fins, skin, bones, heads, and fish innards which can be used as the main ingredient in fish waste liquid organic fertilizer (POC). The results of Aida et al. research (2020) stated that the treatment of POC fish waste with a concentration of 75% was the best treatment with results that significantly affected plant height, number of pods per

plot, and the weight of filled pods per plot in peanut plants.

Based on the results of López-GómezandVenus (2021), liquid organic fertilizer produced from fish waste contains nutrients, namely Nitrogen 2.129 $mg.ml^{-1}$, Potassium 1.225 $mg.ml^{-1}$, and Phosphorus 0.446 $mg.ml^{-1}$. The POC of fish waste has a significant effect on the growth and production of long bean plants. Based on the presence of sufficient content in fish, fish waste such as tails, fins, skin, bones, heads, and innards have the potential to be utilized.

This study aims to determine the effect of the interaction between tillage and the application of organic fertilizer (POC) of fish waste and the single factors of both on the growth and production of peanut plants and to get the best combination

2. MATERIAL AND METHODS

The materials used in this study were peanut seeds of the Talam-1 variety (Appendix 1), fish waste, rice washing water waste, molasses, EM-4, Decis 2.5 EC insecticide compound NPK fertilizer, and Dithane M-fungicide. 45, Roundup Biosorp 486 SL herbicide and water.

The tools used are hoes, machetes, shovels, sieves, tape measure, ruler, digital scales, measuring cups, members, stopwatches, buckets, sprayers, stakes, scissors, stationery, label paper, and documentation tools.

The research was carried out using a Split Plot Design as the environmental design with 2 factors, namely the first factor as the main plot is tillage consisting of three levels, namely no-tillage, minimum tillage, and maximum tillage. The second factor as a subplot was POC concentration consisting of four levels, namely no POC fish waste, 25% POC fish waste (250 ml POC + 750 ml water), 50% POC fish waste (500 ml POC + 500 ml water), and 50% POC fish waste 75% (POC 750 ml + water 250 ml). Thus, 12 treatment combinations were obtained, and each treatment combination was repeated three times so that 36 experimental units were needed. Each experimental unit consisted of 25 plants and there were 5 sample plants in each experimental unit.

Parameters observed were plant height, number of primary branches, flowering age, harvest age, number of pods, number of filled pods, seed production per plant, and weight of 100 seeds. The data obtained were analyzed statistically using analysis of variance and continued with Duncan's multiple range test at the 5% level using the SAS application.

3. RESULTS AND DISCUSSION

Plant height

The results of variance showed that the interaction of tillage and POC as well as the single factor of tillage and POC had a significant effect on the height of peanut plants. The results of further tests on peanut plant height using Duncan's multiple range test at the 5% level are presented in Table 1.

Table.1 Peanut plant height with POC application and tillage

POC	SOIL TREATMENT			AVERAGE p.p
	T0	T1	T2	
	..... cm			
P0	50.93i	54.73 of	57.66c	54.44c
p1	51.86h	54.66 ef	58.30 bc	54.94c
p2	53.07 g	55.47 de	59.00b	55.84b
p3	53.80 fg	56.33d	61.80 a	57.31 a
AVERAGE T	52.42c	55.30b	59,19 a	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level.

Table 1 shows that the height of peanut plants at maximum tillage and 75% POC of fish waste was significantly higher compared to other treatments including no treatment. This is because nutrient absorption in maximum tillage will take place maximally due to better soil porosity making it easier for plants to absorb nutrients. The 75% POC of fish waste provided can provide N elements that function in photosynthesis and stimulate plant vegetative growth, especially the growth of stems and leaves. The increase in plant height is caused by the ongoing events of cell division and elongation which are stimulated by the N element found in POC fish waste. According to Santoyo et al., (2021), nitrogen plays a role in stimulating overall growth,

The single factor of maximum tillage resulted in the highest average plant height, which was 59.19 cm, which was significantly different compared to other treatments. This is because maximum tillage causes the soil to be looser, making it easier for roots to absorb nutrients into the soil, thus spurring plant height growth. Huang et al. (2019) state that good soil structure will help the development of roots well to expand the ability of roots to absorb nutrients.

Table 1 shows a single factor of 75% fish waste POC increased plant height significantly higher compared to 50% fish waste POC, 25% fish waste POC, and no POC. This happens because the content of the element P in the POC of fish waste plays a role in the formation of Adenosine triphosphate (ATP) which is the energy needed by plants in every cell activity which includes the process of cell division, enlargement, and elongation which increases plant height. Liu et al. (2021) state that for plant vegetative growth, sufficient amounts of nutrients N, P, K, and other elements are needed.

The research conducted by Hulopi (2006) states that the use of chicken manure fertilizer provides high average values for the tallest plants quantitatively, ranging from 41.07 cm to 45.73 cm. Meanwhile, in this study, the application of liquid organic fertilizer from fish waste resulted in plant heights ranging from 54.44 cm to 57.31 cm.

Number of Primary Branches

The results of the analysis of variance showed that the interaction of soil tillage and POC had no significant effect on the number of primary branches of peanut plants, while the single factor was processing

soil and POC had a significant effect. The results of further tests on the number of

primary branches of peanut plants using Duncan's multiple range test at the 5% level are presented in Table 2.

Table 2. Number of primary branches of peanuts by applying POC and tillage.

POC	SOIL TREATMENT			AVERAGE P
	T0	T1	T2	
	..... branch			
P0	5.6 g	6.46 ef	7.46 CDs	6.51 b
P1	6.13 fg	6.66 ef	7.60bcd	6.80b
P2	6.63 ef	7.60bcd	8.26 ab	7.50a
P3	7.06 de	8.00 abc	8,60 a	7.88 a
AVERAGE T	6.35c	7,18 b	7.98a	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level.

Table 2 shows that the number of primary branches of peanut plants in maximum soil tillage and 75% POC of fish waste was significantly higher, namely 8.6 branches, significantly different compared to other treatments, but not significantly different compared to maximum tillage and POC of fish waste 50 % ie 8.26 branches as well as minimum tillage and 75% POC ie 8 branches. This is due to the maximum tillage gives a good influence on plant growth. The good growth of peanut plants on soil that is cultivated to the maximum is caused by a decrease in the level of hardness of the soil so that the soil root system becomes better so that the absorption of nutrients is more perfect and the plants can grow well and give higher yields. In addition, tillage can improve soil conditions such as soil physical properties so that the process of root penetration and infiltration of plants becomes better. Fitri et al. (2020) state that tillage will produce good soil friable conditions for root growth so that the ability of roots to absorb nutrients, water, and oxygen becomes easier in helping the process of plant photosynthesis to be maximized.

Maximum tillage increases the number of peanut primary branches significantly compared to minimum tillage and no-tillage. This is because maximum tillage helps improve soil structure to be better when compared to no-tillage and minimum tillage so that plant roots can develop and facilitate nutrient absorption which has a good effect on plant growth including primary branches. NasutionandFitria (2023) stated that the physical properties of the soil affect plant growth, where the physical condition of the soil determines the penetration of roots into the soil, aerase, and plant nutrients.

Table 2 shows that the POC of 75% fish waste and 50% POC of fish waste has significantly more primary branches than the 25% POC of fish waste and without POC. This is because the POC of fish waste contains elements of K and P that are suitable for plant needs so that by giving POC fish waste with the right concentration will produce good vegetative growth of peanut plants. The function of phosphorus is to increase photosynthetic activity. The results of photosynthesis can be utilized by plants for the growth of plant stems. Ali et al. (2020), stated that in the vegetative growth phase, the results of photosynthesis will be translocated to the roots, stems, and leaves. The increase in

photosynthate in this phase causes cell division and elongation, and as a result of this process, the growth of plant organs occurs (Bhattacharya, 2022).

This research has an average number of branches ranging from 6.51 to 7.88 branches. These results are lower compared to the study conducted by Hawalid (2019), which had an average of approximately 7.99 main branches.

Flowering Age

The results of variance showed that the interaction of tillage and POC had no significant effect on the flowering time of peanut plants, while a single factor of tillage and POC had a significant effect. The results of further tests on the flowering age of peanut plants using Duncan's multiple range test at the 5% level are presented in Table 3.

Table 3 shows the flowering age of peanut plants at maximum tillage and 75% POC of fish waste significantly faster than the other treatments, but not significantly different compared to the combination of minimum tillage treatment and 25%, 50%, and 75% POC of fish waste. and also the combination of maximum soil processing treatment and 25% and 50% POC of fish waste without POC. The element P content in fish waste POC is also able to improve soil structure and stimulate flowering in plants. DotaniyaandMeena, (2022) stated that P plays an important role in stimulating the formation of flowers, fruits, and seeds and improving soil structure so that the absorption of nutrients by plants is better.

Table 3. Age of flowering of peanut plants by applying POC and tillage

POC	SOIL TREATMENT			AVERAGE P
	T0	T1	T2	
	..... HST			
P0	31.33 a	27.66b	26.33 bc	28.44 a
P1	30,33 a	27.00 bc	26.00 bc	27.77 ab
P2	27.66b	26.33 bc	25.33 bc	26.44 c
P3	30.00 a.m	25.66 bc	25.00c	26.88 bc
AVERAGE T	29.83 a	26,66 b	25.66c	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level..

The age of flowering at the maximum tillage treatment is significantly faster than the minimum tillage treatment and without tillage. This is because maximum tillage can improve soil structure for the better so that plant roots become better at absorbing nutrients. This is following the statement of KleberandLehmann (2019) that good soil structure makes roots develop well so that the area of absorption of nutrients becomes wider.

Treatment with 50% POC fish waste showed significantly faster flowering time than 25% POC fish waste and no POC, but not significantly different from 75% POC. This is because the P and K content obtained through the administration of fish waste POC at a concentration of 50% is more optimally used by plants in the flower formation process compared to other concentrations. Nongbet et al. (2022)also stated that the application of phosphorus fertilizers to plants affects flower growth

and plant growth will be more optimal if the nutrients needed are available in sufficient quantities and accordance with plant needs. According to Wijaya (2020), the nutrient potassium can accelerate flower formation.

The research conducted by Waruwu et al. (2021) shows that the application of cow manure fertilizer and NPK on peanuts resulted in the plants flowering at 29 days old. However, in this study, the flowering occurred earlier compared to that research, at around 26.44 to 28.44 days.

Harvest age

The results of variance showed that the interaction of tillage and POC and a single factor of tillage had no significant effect on the harvesting age of peanut plants, while the single factor of POC had a significant effect. The results of further tests on the harvesting age of peanut plants using Duncan's multiple range test at the 5% level are presented in Table 4.

In Table 4 it can be seen that the harvesting age of peanut plants at maximum tillage and 75% POC of fish waste was significantly faster than the other combinations including no treatment, but not significantly different when compared to the combination of giving maximum tillage treatment and 25% POC of fish waste. as well as 50%. The parameter of the harvesting age of the peanut plant correlates with the parameter of the flowering age of the peanut plant (Table. 3). The resulting data shows that the plant characteristics are following the harvest criteria contained in the plant description. This is because, in addition to environmental factors, genetic factors also play a role in the observed data on harvest age. Zinsmeister et al. (2020) state that two important factors influence the growth of a plant, namely environmental factors and genetic factors.

Table 4. Age of harvesting peanut plants by applying POC and tillage

POC	SOIL TREATMENT			AVERAGE P
	T0	T1	T2	
	..... HST			
P0	95.66a	94.33a	95.33a	95.44 a
P1	95.00 ab	94.33 bc	93.33 de	94.22b
P2	94.33 bc	94.33 bc	93.33 de	94.00b
P3	93.66 cds	94.00 cds	92.67e	93.44c
AVERAGE T	94.66 a	94.50a	93.66b	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level.

The maximum tillage treatment showed a significantly faster harvest time compared to the minimum tillage and no-tillage. According to Khotimah et al. (2022), the method of tillage affects the vegetative, generative, and phenological growth of plants.

Treatment with 75% POC fish waste showed a significantly faster harvest time compared to 25%, 50% POC fish waste, and without POC. This has to do with the faster the flowering age of peanut plants, the faster the harvesting age and this is also due to the P content contained in liquid organic fertilizer which functions to spur flowering, accelerate the rate of photosynthesis, and produce translocated photosynthates. to the pods,

so that the filling of the pods takes place quickly and results in an earlier harvest. Syafrina (2009) states that the function of P for plants is to stimulate generative growth such as flower formation, fruit formation, and seed filling. In the research conducted by SigaandYashinta Bolly (2019), peanuts could be harvested 90 days after planting (DAP). However, in this study, peanuts were harvested as early as 93.44 days.

Number of pods per plant

The results of variance showed that the interaction of soil tillage and POC had no significant effect on the number of peanut pods, while the single factor of tillage and POC showed a significant effect. The results of further tests on the number of pods of peanut plants using Duncan's multiple range test at the 5% level are presented in Table 5.

In Table 5 it shows that the number of peanut plant pods was significantly higher in the maximum tillage and fish waste POC of 0%, 25%, 50%, and 75% compared to the other treatments, but not significantly different from the combination of minimum tillage and fish waste POC 75%. This is due to the maximum tillage combined with the POC of fish waste where POC has a P content which is also able to influence the number of plant pods optimally. According to Aziza et al. (2022), the availability of nutrients in sufficient and optimal quantities affects the growth and development of plants so that they produce production according to their potential.

Table 5. Number of peanut pods with POC application and tillage

POC	SOIL TREATMENT			AVERAGE P
	T0	T1	T2	
	..... fruit			
P0	33.96f	36,43d	38.16 a	36,18b
P1	34.33 ef	36.93 cds	38.10 a	36,25b
P2	34.50 ef	37.40 bc	38.36a	37,40a
P3	34.65e	37.90 ab	38.56a	37.33 a
AVERAGE T	34.30c	37,16b	38.31a	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level.

The number of bean plant pods at maximum tillage was significantly more than the minimum tillage and no-tillage. Maximum tillage gives better results than no-tillage and minimal tillage because of its ability to improve physical, chemical, and biological properties which also have a better effect on plant physiological processes. Susanti et al. (2019) state that the physical, chemical, and biological properties of soil change with proper and perfect tillage.

In Table 5 it can also be seen that the provision of 50% and 75% POC of fish waste showed a significantly higher number of plant pods compared to the provision of 25% POC of fish waste and no POC. This is because the P content contained in the POC of fish waste is 50% and 75% higher when compared to the 25% POC of fish waste and without POC which can be used optimally for plants in increasing the number of peanut plant pods. KurniawatiandRahayu, (2022) state that the number of pods formed is

influenced by macronutrients, especially phosphate which plays a role in flower formation, seed maturation, and protein formation and neutralizes organic acids produced in metabolism so that the flowers formed will affect the number of pods formed.

The research conducted by SigaandYashinta Bolly (2019), shows that the application of chicken manure fertilizer has a significant effect on the number of peanut pods, resulting in an average of 47.95 to 68.23 pods. However, in this study, the number of peanut pods is lower, ranging from approximately 38.18 to 37.33 pods.

Number of pods contained

The results of variance showed that the interaction of tillage and POC as well as the single factor of tillage and POC had a significant effect on the number of pods filled with peanut plants. The results of further tests on the number of pods filled with peanut plants using Duncan's multiple range test at 5% level are presented in Table 6.

Table 6 shows that the number of pods containing peanut plants was significantly higher at maximum tillage and 75% POC of fish waste compared to other combinations including no treatment. This is due to the maximum tillage that helps the ability of soil to maintain the availability of K nutrients, absorb water, and have good drainage. The combination with the provision of 75% POC concentration can increase the number of pods filled with peanut plants through their role in the process of photosynthesis. According to Ramadhani et al. (2022), the factors that affect potassium uptake in soil include drainage and soil water content. PawarandRana, (2019) added that potassium can strengthen plant tissues and organs so that they do not fall off easily, and increase the translocation of photosynthetic products into the phloem.

Table 6. Number of pods filled with peanut plants by applying POC and tillage

POC	SOIL TREATMENT			AVERAGE P
	T0	T1	T2	
	..... fruit			
P0	32,66f	34,64 d	34,63d	33.97d
P1	33.03 ef	35.13 cds	35.56c	34.57c
P2	33.00 ef	35.60c	36,36 b	34.98 b
P3	33.36 e	35.80 bc	37.50a	35.55a
AVERAGE T	33.01c	35,29b	36.01a	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level.

Maximum tillage shows significantly more pods containing peanut plants than minimum tillage and no-tillage. This is because the maximum tillage can improve the physical properties of the soil for the better whereas the physical properties also influence the chemical and biological properties of the soil so that it influences the availability of nutrients in the soil. HailuandMehari, (2021) states that soil physical properties are soil properties that affect plant growth and production because they will determine root penetration in the soil, the ability of the soil to hold water, drainage, soil aeration, and availability of soil nutrients.

In Table 6 it can also be seen that the administration of 75% POC of fish waste showed a significantly higher

number of pods containing plants compared to the administration of 25%, 50%, and no POC of fish waste. This is because the K content in POC fish waste concentration of 75% is optimal for plants to increase the number of pods filled with peanut plants in the role of K in the translocation process. According to Taufiq (2002), the lack of K nutrients in plants can inhibit the transportation process in plants. Therefore, for the process of transporting nutrients and assimilating in plants to take place optimally, the element K in plants must be optimal.

The research conducted by Rozak (2020) shows a significant difference in the variables of the number of filled pods per plant ranging from approximately 27.33 to 32.54. However, in this study, a higher number of pods were obtained, with an average of approximately 35.29.

Seed production per plant

The results of variance showed that the interaction of tillage and POC as well as the single factor of tillage and POC had a significant effect on seed production per peanut plant. The results of further tests on seed production per peanut plant using Duncan's multiple range test at the 5% level are presented in Table 7.

Table 7. Seed production per peanut plant by applying POC and tillage

POC	SOIL TREATMENT			AVERAGE P
	T0	T1	T2	
	..... g			
P0	22.86 e	24.66 cds	24,23 d	23.85c
P1	23.13 e	24.60bcd	25.10 b	24,27 b
P2	23.10 e	24.90 bc	25.83 a	24.61 a
P3	23.36 e	25.06b	26,26 a	24.90a
AVERAGE T	23.11 c	24.75b	25.35a	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level.

Table 7 shows that the seed production per peanut plant was significantly higher with the addition of 75% and 50% POC of fish waste and maximum tillage compared to other combinations including no treatment. This is because the loose soil texture obtained through maximum tillage provides good benefits for plants in the process of absorbing nutrients from the soil. Suntoro et al. (2018) the denser the soil the higher the density of lindak, which means it is more difficult for plant roots to penetrate and of course affects the absorption of nutrients through the roots towards the top of the plant.

Maximum tillage shows significantly higher seed production per peanut plant compared to minimum tillage and no-tillage. For soil to become a good growing medium for plants, it is necessary to do proper tillage to help plant growth and development during cultivation activities. Franza et al. (2020) the denser the soil the higher the density of lindak, which means it is more difficult for plant roots to penetrate and of course affects the absorption of nutrients through the roots towards the top of the plant.

In Table 7 it can also be seen that the administration of 50% and 75% POC of fish waste showed significantly higher

results in seed production per plant compared to 25% POC of fish waste and without POC. Elements P and K are needed in the formation of seeds in peanut plants. Phosphorus is an important component of compounds for energy transfer (ATP and nucleoprotein) and potassium helps maintain osmotic potential and water uptake and plays an important role in photosynthesis because it directly increases growth and leaf area index, therefore also increases CO2 and increases the translocation of photosynthetic products (Isoyama et al., 2023). Lack of phosphorus nutrients results in many unfilled peanut pods and reduces the number of flowers and the number of gynophores resulting in low peanut yields.

The research conducted by (Rozak, 2020)shows a significant difference in the variables of the dry seed weight per plant, ranging from approximately 27.89 to 32.78. However, in this study, a higher number of pods were obtained, with an average of approximately 23,87 to 24.90.

Weight 100 dry seeds

The results of variance showed that the interaction of tillage and POC had no significant effect on the weight of 100 dry seeds of peanut plants, while a single factor of tillage and POC had a significant effect. The results of the follow-up test on the weight of 100 dry seeds of peanut plants using Duncan's multiple range test at the 5% level are presented in Table 8.

Table 8. The weight of 100 dry seeds of peanut plants with POC application and tillage

POC	SOIL TREATMENT			AVERAGE P
	T0	T1	T2	
	..... fruit			
P0	35.73 g	36.00 fg	37.10 bc	36,27c
P1	36.10 fg	36.26 ef	37,43 b	36,60 b
P2	36.23 de	36.83 cds	37.20 bc	36.75b
P3	36.56 de	37.10 bc	37.90a	37,18 a
AVERAGE T	36.15c	36.55 b	37,40a	

Numbers followed by the same lowercase letter in the same row and column are not significantly different according to Duncan's multiple range test at the 5% level.

Table 8 shows that the weight of 100 dry seeds of peanut plants was significantly heavier at maximum tillage and 75% POC of fish waste compared to other combinations including no treatment. According to Ezward et al. (2020), The dry weight of a plant is an indication of the absorption of nutrients carried out by the plant.

Maximum tillage showed that the weight of 100 dry seeds of peanut plants was significantly heavier than that of minimal tillage and no-tillage. Peanut plants require loose soil conditions to be able to develop optimally where this is obtained through proper tillage, namely maximum tillage. Soviani et al. (2019) state that loose soil conditions will provide convenience for bean plants, especially in terms of seed development, fruit buds penetrating the soil, and good pod formation.

In Table 8 it can also be seen that giving 75% POC of fish waste shows that the weight of 100 dry plant seeds is significantly heavier than giving 50% POC of fish waste, giving 25% POC of fish waste, and without POC. The N and K content obtained through the provision of fish waste POC is needed by plants in

their physiological processes such as photosynthesis. The N and K content obtained in the provision of 75% POC of fish waste is considered optimal for plants for their development, especially in production. Simbolon et al. (2018) stated that the element N is needed by plants for the synthesis of proteins and other important ingredients, while the element K plays a role in stimulating the translocation of photosynthetic products from the leaves to other parts of the plant.

The number of 100 peanut seeds in this study ranges from approximately 35.27 to 37.18. These results align with the research conducted by Anwar et al. (2020), which reported a range of approximately 35.42 to 38.03.

4. CONCLUSION

The interaction of soil processing and POC of fish waste affects increasing plant height, number of primary branches, number of filled pods, seed production per plant, and weight of 100 dry seeds as well as accelerating harvest time. Maximum tillage affected the parameters of plant height, number of primary branches, flowering age, number of pods per plant, number of filled pods, seed production per plant, and weight of 100 dry seeds compared to minimum tillage and no-tillage. 75% POC of fish waste has an effect on plant height, number of primary branches, number of filled pods, and weight of 100 dry seeds compared to 50% and 25% POC of fish waste and no POC of fish waste. The combination of maximum tillage and 75% POC of fish waste showed better results in increasing the growth and production of peanut plants.

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